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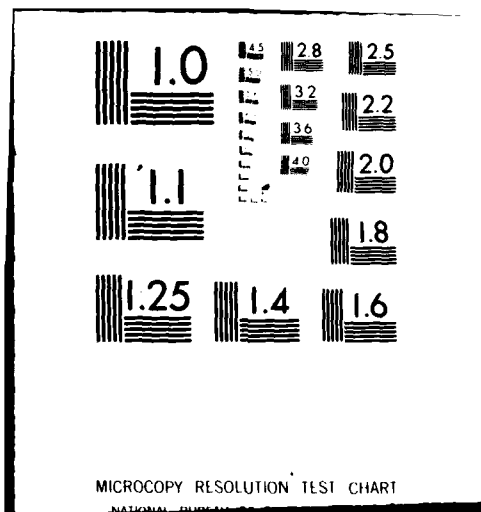
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Walter S. Baer

July 1980

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REDUCING U.S. VULNERABILITY TO OIL SUPPLY DISRUPTIONS*

OIL IMPORT DEPENDENCE AND VULNERABILITY

The United States' dependence on imported oil poses two interrelated but distinct problems: 1) chronic economic losses and 2) vulnerability to supply disruptions. Each problem has its own characteristic time frame and requires a different set of policy responses.

We hear most about the chronic economic problems associated with import dependence. Our daily purchases of six to seven million barrels of oil and refined products from foreign suppliers results in large economic losses to the U.S. economy--losses from transfers of wealth to the producing countries, higher inflation, balance of payments problems, and the decline of the dollar. These problems are with us today and will remain with us for some time to come. They are also receiving high priority policy attention. The large synthetic fuels program recently enacted, conservation measures, and phased decontrol of oil and gas prices all represent attempts to do something about the steady-state dependence problem.

The second, closely related problem is our vulnerability to oil supply disruptions. It arises not because we import so much oil, but because so much of the oil we and our allies import comes from the politically unstable Middle East. Unlike the chronic economic losses from import dependence, oil supply disruptions are, of course, unpredictable. But a significant disruption will have very severe economic and political impact on all the industrialized nations. And, regrettably, while we have concentrated on conservation and other measures to reduce import dependence, we have largely neglected responses to the vulnerability problem itself. Reducing oil imports certainly helps, but it does not eliminate the problem. What is needed is contingency planning to prepare us to deal with possible emergencies. This paper outlines some steps we can take to provide emergency supplies and cut demand in the event of a major oil supply disruption.

*Prepared for a conference on "Solutions to the Energy Problem," University of Southern California, July 11, 1980.

Dependence on Persian Gulf Oil

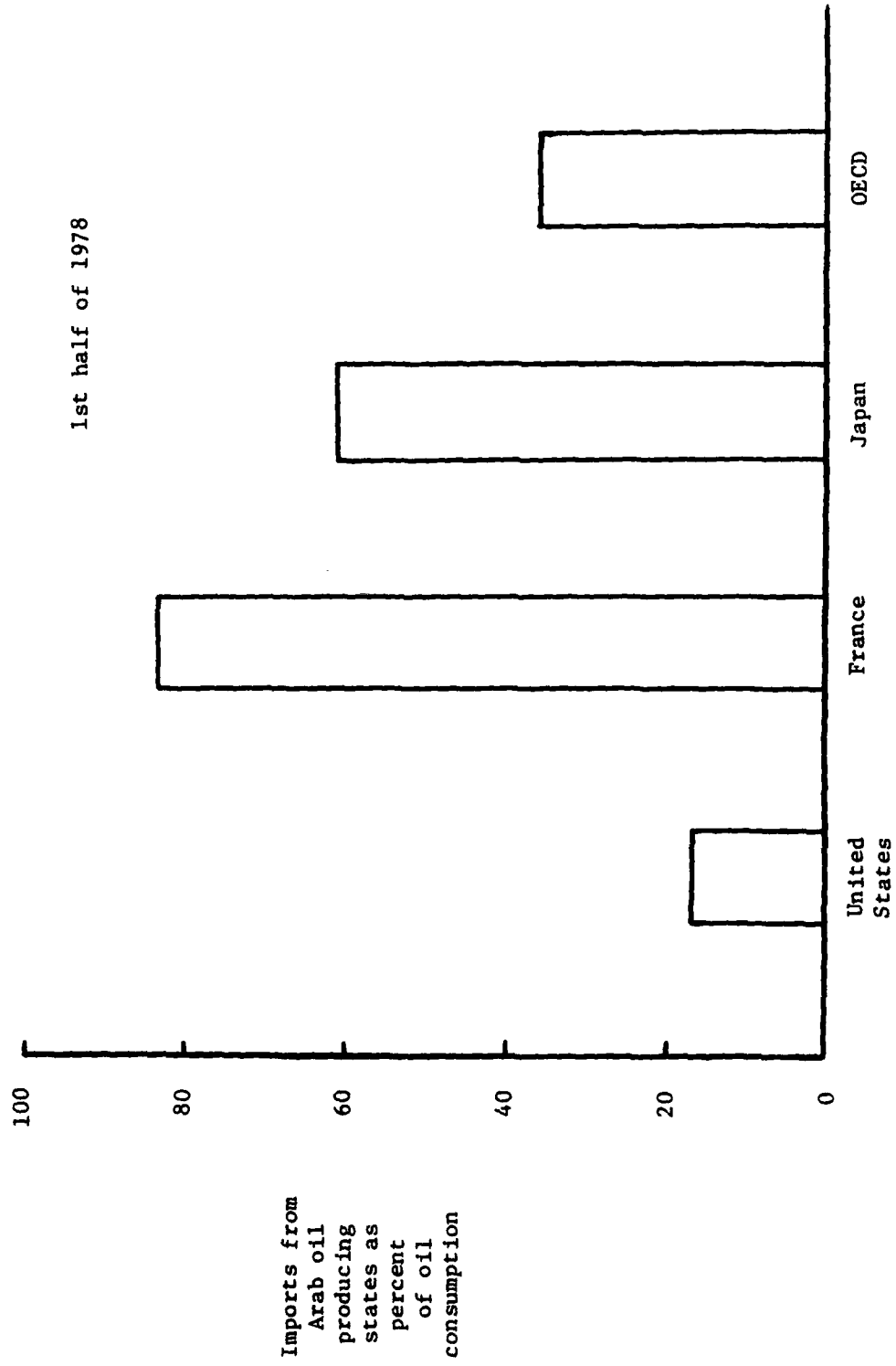
Figure 1 illustrates the international nature of the dependence and vulnerability problems. The United States imports about 3 million barrels per day (mbpd) from the Arab Oil Producing Countries (OAPEC), but this represents only 17 percent of our total oil use. Our allies in Western Europe and Japan are a good deal more dependent. France imports 83 percent of its oil from the Middle East, Japan 60 percent, and the industrialized countries as a whole--represented by the Organization for Economic Cooperation and Development (OECD)--receive a little more than one-third of their oil from Arab producers.

This dependence will persist throughout the 1980s despite the measures that we and other countries are adopting to reduce oil imports. Rising prices will decrease demand and encourage new sources of supply, such as synfuels, but significant production of alternative liquid fuels is at least ten years away. The increased exploration for and production of oil and gas outside the Persian Gulf region will likely be matched by increased demand from developing nations. And despite price increases, we will be fortunate if U.S. domestic oil production does not decline significantly from its current level during the decade.

Likelihood of Future Oil Supply Disruptions

With our continuing dependence on oil from the Middle East, we and our allies face the very real prospect that these supplies could be cut off, rapidly and without warning, by any number of events in that troubled part of the world. For five years after 1973 we tended to view political uses of the "oil weapon," like the Arab embargo after the Yom Kippur War, as the primary threat. But the sharp cutback of Iranian oil exports in 1978-79 made us realize that supply disruptions can occur because of civil unrest largely unrelated to world markets or politics. Looking ahead in the 1980s, we see a host of unpleasant possibilities: civil unrest in other producing states, including Saudi Arabia; expansion of ever-present regional hostilities between Iraq and its neighbors; a new Arab-Israeli war; intervention of the Soviet Union; or even actions that are not under the control of governments, such as terrorist destruction of pipelines and port facilities, or a tanker accident that could block the Strait of Hormuz.

Fig. 1--DEPENDENCE ON MIDDLE EAST OIL



Source: International energy statistical review, CIA

Any one of these events may be relatively improbable, but taken together, they add up to a significant probability that something will go wrong. Over the next five years, it seems more likely than not that we will have to deal with a supply disruption at least as great as that caused by the shutdown of Iranian exports in 1978-79. And we should remember that those shortages, although never more than five percent of world oil production, led to a doubling of world oil prices, long gasoline lines in the United States, and near panic reactions on the part of some consuming countries.

Economic and Political Effects of Disruptions

A significant oil supply disruption will produce severe effects, both economic and political. As an example of a major disruption, consider the impact if Middle East supplies were cut by nine million barrels per day for a period of one year. This represents the approximate total of current exports from Saudi Arabia. Under current sharing arrangements worked out by the International Energy Agency, the United States would see its imports reduced by about 35 percent of the total cut, or by more than 3 mbpd.

Several groups inside and outside government have estimated the economic effects of such a disruption for the United States and other industrialized countries.* Industrial production and employment would fall dramatically. Oil prices would rapidly rise to above \$100 a barrel. Under current conditions, for example, calculations by Henry Rowen and colleagues at Stanford University indicate that the United States would suffer a loss of some \$200 billion, or seven percent of GNP, from such a disruption. Estimates made by the Congressional Budget Office are of a similar magnitude. The impact in Western Europe and Japan would be even greater: nine and ten percent losses in GNP, respectively, according to the Stanford estimates. The general economic dislocations would make last summer's gasoline lines seem like a pleasant diversion.

* These results must be considered speculative, because the economic models used to derive them were developed for incremental changes in inputs, not for the large dislocations associated with a disruption.

The political effects of such a disruption are less amenable to analysis, but even more sobering. Internationally, it would add great strain to an already shaky Western alliance. Consuming countries might rush to bid in the spot market for petroleum, as they did in 1978, driving spot market prices through the roof. Individual consuming nations would also probably try to make separate, bilateral deals with those producers unaffected by the disruption. Depending on the political nature of the interruption, there could be demands for some kind of Western military response. The United States is now working to build greater capability to project forces into the region during a crisis. But we are obviously not the only actor. The threat of direct Soviet intervention remains a major factor in any scenario. In the event of true chaos in the Persian Gulf, the Soviet Union might be tempted to intervene in order to "stabilize" the situation and restore oil supplies to Western Europe and Japan.

PREPARATIONS TO REDUCE VULNERABILITY

How, then, can we better prepare ourselves for dealing with future oil supply disruptions? Some measures to increase supplies and reduce demand in an emergency are listed below:

Preparatory measures for emergency supplies

- A Strategic Petroleum Reserve
- Private stockpiles of oil and refined products
- Standby production and distribution capacity
- Emergency fuel switching for electricity generation

Emergency measures to restrain demand

- Rationing
- Emergency taxes or tariffs

These are largely standby measures or contingency plans, which again should be distinguished from longer-term policies to reduce dependence such as synfuels or conservation programs. They are also measures that,

to be effective, should be closely coordinated among the industrialized, oil consuming nations. Although this paper principally addresses U.S. policies, vulnerability to oil disruptions is an international problem that requires international responses.*

A Strategic Petroleum Reserve (SPR)

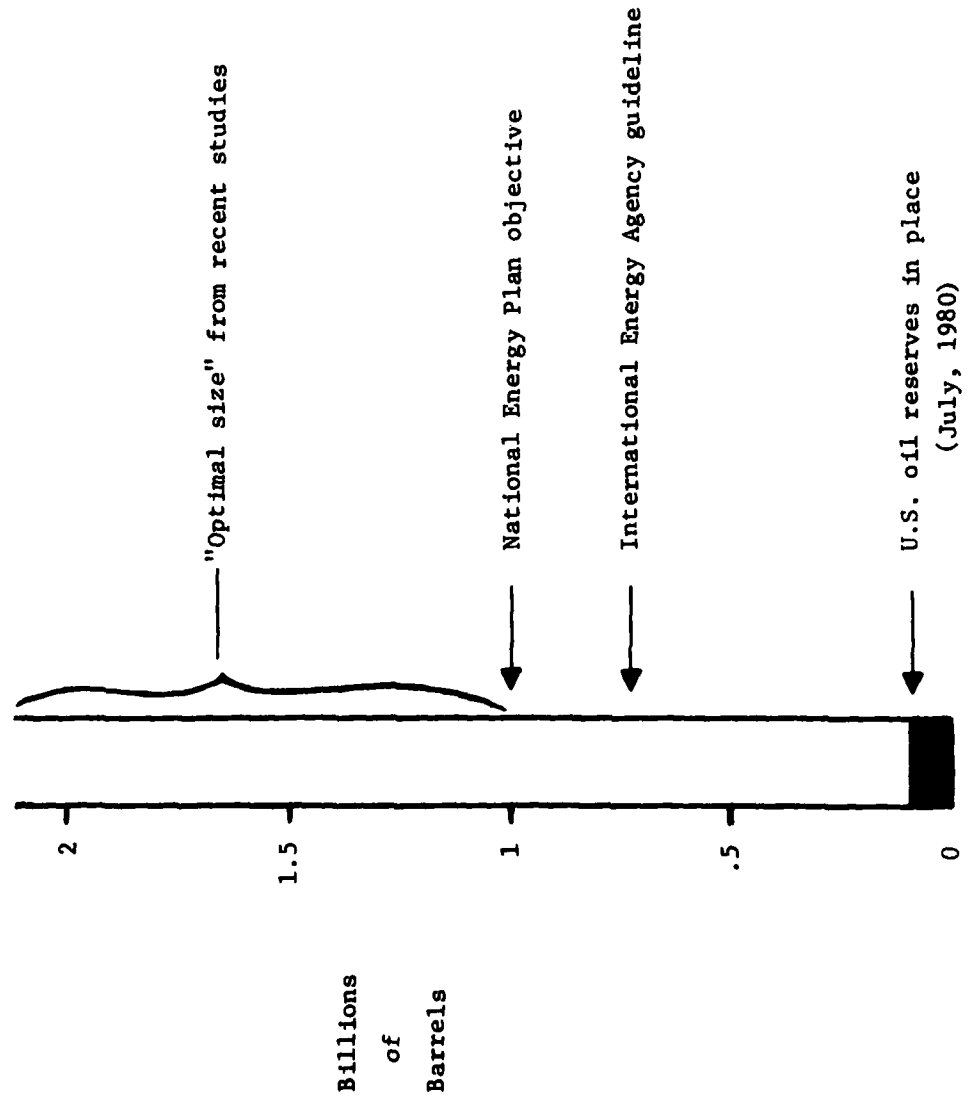
The most important supply side measure is to build up a national oil reserve that can be rapidly pumped out for use during a supply disruption or other emergency. Such national reserves are helpful in several ways. They act as deterrents against a political embargo that might be threatened, for example, should war break out again between the Arab states and Israel. If a supply interruption does occur, petroleum reserves can help keep oil prices from exploding. The Stanford group estimates that with total OECD reserves of 2.8 billion barrels, the world price of oil would remain some \$50 a barrel below the price it could reach without such reserves.

Knowledge that stockpiles are available should also lessen panic reactions by consumers, industrial firms, and governments themselves. This last point is of particular importance. If a disruption occurs, and no petroleum reserves are readily available, the United States and other governments may feel great pressures to take immediate political or military actions. The availability of reserves will buy time to plan more measured responses.

The International Energy Agency has recommended that each member nation store at least 90 days' supply of petroleum imports. For the United States, this represents approximately 750 million barrels (Fig. 2). Storage facilities for about 250 million barrels have been built, with a second phase underway to construct storage for another 280 million barrels. President Carter in the 1977 National Energy Plan called for an expanded, billion-barrel U.S. Strategic Petroleum Reserve (SPR). Recent studies conclude that even larger petroleum reserves

* Discussion of current and proposed arrangements to share oil supplies in an emergency, through the International Energy Agency or some other means, is beyond the scope of this paper.

Fig. 2--THE U.S. STRATEGIC PETROLEUM RESERVE (SPR)



would have positive cost benefit ratios. The SPR optimal size depends on one's estimates of the probability and extent of future disruptions. For the U.S., a ten percent probability per year of a large disruption (3 million barrels per day for one year) is enough to justify a SPR larger than a billion barrels. But at present, only 93 million barrels are actually in place, or less than a two week supply of imports.

Expanding the Strategic Petroleum Reserve thus becomes an urgent matter for reducing U.S. vulnerability. The problems that have prevented SPR purchases since the Iranian crisis of 1978 are no longer compelling. Softness in the current world oil market would permit purchases without significant upward pressure on oil prices. Consequently, we should be in a better position than before to deal with Saudi Arabian objections to our filling the SPR. Although the impact of oil purchases on the federal budget has been another concern,^{*} Congress has now mandated a resumption of oil purchases for the SPR, but at an initial level of only 100,000 barrels per day. This is far too low a rate to achieve a credible stockpile. At 100,000 barrels per day, it would take nearly twenty years to reach a 750 million barrel SPR. Doubling or tripling that rate seems a sensible near-term objective.

Plans to Use the SPR

A Strategic Petroleum Reserve has little value unless there are plans to use it in an emergency. In the past, some have considered the SPR for its deterrence or insurance value alone. According to this view, withdrawals from the SPR should be made only as a last resort, like collecting from an insurance policy only when the insured is dead

^{*}Filling the SPR at 300,000 barrels per day (the rate established before the Iranian crisis) would add more than \$3 billion to the annual budget deficit at current world prices. Off-budget financial arrangements probably can be justified for the SPR, however, especially since rising world oil prices suggest the likelihood of inventory gains from holding reserves. An SPR Administration separate from the Department of Energy could be given independent financing authority. Its securities would be backed not only by U.S. Government guarantees, but by barrels of oil in the ground, which could appeal to many investors. Alternatively, a COMSAT-like, public-private corporation could finance and manage the SPR. This is much like what has been done in West Germany.

or severely disabled. However, recent analyses conclude that the SPR's value is increased if it is used during small as well as large interruptions. Drawdown will both reduce panic among oil consumers and ease the necessary economic adjustments.

Regrettably, the United States has no established plan for SPR drawdown during emergencies. Establishing such a plan is thus a priority item for energy policy. The drawdown plan must include the criteria that would trigger SPR withdrawal, the withdrawal rate, and the methods for determining prices and allocations. Standby authority for implementing the plan should be established by Congress after thorough analysis, hearings, and public debate. The SPR drawdown should then proceed rather automatically during an emergency. This will enable the President and other top government officials to turn attention to the international security aspects of an oil emergency, rather than domestic fuel allocations.

Private Stockpiles of Oil and Refined Products

Policy should encourage building oil reserves in private hands as well as in the government-controlled SPR. Today, private stocks of oil and refined products are at an all-time high, due to inventory buildups in response to last year's shortages and price increases. Firms are estimated to hold more than 250 million barrels above minimum inventory levels, or about three times the amount of oil in the SPR.

Rising oil prices have given firms incentives to stockpile, but they see substantial disincentives as well. Government reallocation in an emergency is their principal concern. It's the old story of the ant who plans ahead versus the grasshopper who doesn't; but the ants fear that the grasshoppers will have more votes in Congress to reallocate the ants' supplies during a crisis.

Reducing the fear of government reallocation would be the most effective way to maintain or increase private stockpiles, but this is easier to preach than to put into practice. Regulations or legislation enacted now to encourage ant-like behavior could still be rescinded later by the grasshoppers. However, some specific initiatives can be undertaken. Holding costs for private inventories could be reduced by allowing

private storage in the SPR--at least until it is filled with government purchased oil. Tax credits or other subsidies could be offered for private stockpiles. Subsidy of private stockpiles, of course, weakens the argument against their reallocation in the event of emergency.

Finally, the Energy Policy and Conservation Act of 1975 authorizes the Secretary of Energy to require importers and refiners to store up to three percent of the oil imported or refined in the previous year. Such mandatory requirements could be increased if other incentives fail.

Standby Production and Distribution Capacity

There are limited, but still important opportunities to increase oil and gas production in an emergency. With world prices so high, little shut-in capacity exists in the United States (or anywhere outside the Persian Gulf region). A few fields in Texas that are currently non-producing because of state production ceilings could be tapped, perhaps contributing as much as 100,000 additional barrels per day. Other producing wells could be pushed beyond their optimal long-term production rates for a short period of time, if it were in the national interest to do so at the expense of long-term recovery.

More Alaskan oil could be shipped to other parts of the country by increasing the operational capacity of the Trans-Alaska Pipeline. The pipeline was designed to carry 2 million barrels per day but is currently working at less than 1.5 mbpd. Additional pumping stations would be needed to handle the increased flow. Even if the pumping stations are not justified by current economics, they could be subsidized and put in place on a standby basis as part of an emergency preparedness program.

Canada and Mexico could also produce more oil and gas during a disruption of Persian Gulf supplies. Their capabilities to expand exports rapidly are now limited by existing distribution as well as production facilities. However, Mexican President Lopez Portillo has indicated that Mexico should build excess capacity of about ten percent of oil production, or about 250 thousand barrels per day.* Greater

* David Ronfeldt, Richard Nehring and Arturo Gandara, Mexico's Petroleum and U.S. Policy: Implications for the 1980s, The Rand Corporation, R-2510-DOE, June 1980.

increases in emergency export capacity by either Canada or Mexico would require multilateral agreements, and probably some front-end financing by consuming countries. For Mexico in particular, multilateral arrangements, perhaps through the International Energy Agency, appear more acceptable than an attempt to secure emergency supplies for the United States alone.

Emergency Fuel Switching for Electricity Generation

Contingency plans should be developed for generating electricity from other fuels during an oil supply disruption. The United States currently uses about 1.5 million barrels per day of oil for electricity generation, principally in the Northeast, Florida, Texas and California. With pre-planning, much of that could be replaced in an emergency.

If natural gas were available, it would be the replacement fuel of choice. Operating coal and nuclear power plants at higher-than-usual capacity factors would also help, if the extra power can displace that generated from oil-fired plants. This requires long-distance power transfers (known as "wheeling") between the coal and nuclear plants and the oil consuming utilities. Although most utilities now wheel power routinely, some may have to increase the capacity of their ties with other utility systems to prepare for emergency power exchanges. Changes may also be needed in some state utility commission rules and contracts among utilities to facilitate emergency wheeling.

Emergency Measures to Restrain Demand

A severe oil supply disruption will require strong measures to cut demand quickly. The general alternatives are direct government allocation of supplies, such as gasoline rationing, and price increases through emergency tariffs or taxes.

Any rationing scheme would be expensive and an administrative monstrosity. The recent Congressional hearings on the gasoline rationing plan developed by the Department of Energy clearly identify the problems. Gasoline rationing would take six months to a year to implement under the best of circumstances. The first round of coupon distribution would probably miss 15 to 20 million vehicles. The program would

face millions of exemption requests, as well as continuing problems of counterfeiting and fraud. And the rationing bureaucracy created to deal with these problems would be difficult to disband once the emergency was over.

For these reasons, analysts generally favor emergency tariffs or taxes to cut demand and reduce the enormous additional transfers of wealth that would otherwise go to oil producers during a supply disruption. In principle, a tariff or tax would impose lower administrative and social costs than rationing, and presumably would be easier to remove after the emergency ended. A tariff, as opposed to a gasoline tax, has the advantage of applying neutrally to all oil products, but a tax at the refinery input level could give essentially the same results.

The size of the emergency tariff or tax would depend, of course, on the severity of the disruption. For the previous example of a total 9 million barrel per day cut (translating to a 3 mbpd loss for the United States under current sharing arrangements), analysts estimate that roughly doubling the present price would clear the market. This means a tariff or tax of \$30-\$40 a barrel.

The real issue is fairness. The chilly reception given recent proposals for a gasoline tax or tariff one-tenth that size shows how politically difficult it is to impose energy taxes on consumers, even as emergency standby measures. The windfall profits tax could serve to drain crisis-caused profits from domestic producers. Any new tariff or tax proposal to avoid windfall transfers to foreign producers must include means to rebate money directly to consumers. And the rebate mechanism must be quick, highly visible, and perceived as fair by the American public.

Many rebate schemes can be suggested, including direct refunds to individuals via the federal income tax, payments to all households, or specific rebates to those affected most harshly. Whatever the rebate mechanism, Congress does not now seem ready to pass new energy taxes or tariffs, even on a standby basis. Still, it seems important to address these issues publicly, including holding Congressional hearings, to set the stage for more rapid response if it becomes necessary.

In summary, our vulnerability to oil supply disruptions is at least as serious as the more chronic economic problems of import dependence. Measures to deal with the vulnerability problem include:

- o Increasing oil purchases for the Strategic Petroleum Reserve;
- o Providing incentives for private stockpiling; and
- o Developing emergency preparedness plans for
 - SPR drawdown
 - Electricity generation from gas, coal, nuclear
 - Emergency tariffs or taxes
 - Standby gasoline rationing.

This does not mean that we should delay current measures to reduce overall import dependence, such as the decontrol of oil and gas prices. But we must focus more clearly on the vulnerability problem itself as the most critical short-term energy issue for the United States and our allies. Only if we are prepared to weather oil supply disruptions in the next few years will we be able to devise longer-term solutions to our energy problems.

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